

epoxidopregnene-17 α ,21-diol-3,20-dione,⁶ was not observed in these fermentations.^{13,14}

These studies would seem to preclude I as an in-

(13) In another experiment $\Delta^4,16$ -pregnadiene-3,20-dione was incubated with *Actinomyces* A.T.C.C. 11009, a 16 α -hydroxylating organism (D. Perlman, E. Titus and J. Fried, *THIS JOURNAL*, **74**, 2126 (1952)). The formation of $\Delta^4,16\alpha,17\alpha$ -epoxidopregnene-3,20-dione could not be demonstrated.

(14) Extension of these studies to include other types of microorganisms and additional substrates is in progress. A discussion of the mechanistic implications of microbiological epoxidation will appear elsewhere.

intermediate in the microbiological synthesis of hydrocortisone from Compound S. In this respect they complement the findings of Hayano and Dorfman¹⁵ with mammalian adrenal enzyme systems.

(15) M. Hayano and R. I. Dorfman, *J. Biol. Chem.*, **211**, 227 (1954). Rather contrary findings are described by K. Miescher, A. Wettstein and F. W. Kahnt, *Acta Physiologica Latino Americano*, **3**, 144 (1953).

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RECEIVED AUGUST 1, 1955

BOOK REVIEWS

An Advanced Treatise on Physical Chemistry. Volume V. Molecular Spectra and Structure. Dielectrics and Dipole Moments. By J. R. PARTINGTON, M.B.E., D.Sc., Emeritus Professor in the University of London. Longmans, Green and Co., 55 Fifth Avenue, New York 3, N. Y. 1955. x + 565 pp. 17 × 25.5 cm. Price, \$15.50.

The present volume of Professor Partington's treatise is concerned with molecular spectra, dielectric constants and dipole moments. Inclusion of these topics in one volume is appropriate, and results in a comprehensive survey of two important aspects of molecular structure. The treatise should be particularly valuable to the graduate student in physical chemistry who is preparing for examinations. At the same time it is a useful reference work for specialists. The style of writing is exceptionally clear, and should appeal both to specialist and non-specialist.

The form of presentation is unusual, and may be described as a mixture of experimental description, physical theory and pure mathematics. If the last component appears to be overemphasized, it must be admitted that the mathematical background is unusually complete for a text of this kind. Consequently there is less need for consultation of other texts. For example, applications of quantum mechanical theory to problems of molecular structure is accompanied by an unusually complete (60 page) treatment of spherical harmonics, and later by a 32 page discussion of symmetry and group theory. Many painful details are included which are frequently avoided by other writers, or relegated to appendices or footnotes. Similarly, the treatment of dielectrics begins with a full discussion of elementary theory of alternating current circuits. Mention should be made also of the large number of literature references (4056, according to the author) in the present volume. This feature should be particularly helpful to the serious student.

The discussion of experimental material is uneven. It is rather brief in connection with molecular spectra, but rather complete in connection with dielectric phenomena. Methods of dielectric measurements are described in some detail, and are well illustrated by numerous diagrams of apparatus and electrical circuits. Full tables are given of dielectric constants, Kerr effect data and of dipole moments. The relation of dipole moments to molecular structure is discussed fully.

The treatise is less satisfactory in some aspects of fundamental physical theory, particularly the theory of molecular spectra. Discussion of the origins and meaning of infrared and electronic spectra are brief, and perhaps inadequate. The "simple" theory of the Raman effect on page 28 is certainly unsatisfactory, although a more nearly correct discussion is given later on pages 48 and 54. It appears that a more straightforward explanation of molecular orbitals might have been given and more extensive discussion based on recent calculations might have been included.

This volume will certainly not appeal to hurried readers who seek a streamlined account of molecular structure. Others may reject it for aesthetic reasons, for when experimental details, physical theory and all necessary mathe-

matics are included in juxtaposition, some sense of logical development inevitably will be lost. This feature should not detract, however from its utility as a valuable reference work for the serious student of molecular structure.

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Biochemistry of Nitrogen. Series A. II. Chemica Nr 60
A Collection of Papers on Biochemistry of Nitrogen and Related Subjects. Dedicated to Artturi Ilmari Virtanen. Editorial Board: N. J. TOIVONEN, E. TOMMILA, J. ERKAMA, P. ROINE, J. K. MIETTINEN. Suomalainen Tiedeakatemia, Publishers, Helsinki, Finland. 1955. 535 pp. 17.5 × 25 cm. Price, 2800 Mk., Bound 2800 Mk.

"The contributions of this volume offer an international tribute to an esteemed scientist" . . . "who has laid the foundation for Finnish biochemistry."

The volume consists of forty-eight papers each of which bears a relationship to the past work of Virtanen. This evidence of intellectual ancestry is not surprising in view of the extensive investigative activity of the honoree and his profound influence upon knowledge in this field. Most of the papers report experiments in an amount of detail which characterizes journal articles. Some of the papers, however, are brief reviews. These latter include, "The Synthesis of Nucleotide Coenzymes," by A. R. Todd; "Nitrogen-Deficient Microorganisms: A New Technique in Microbiological Chemistry," by J. De Ley; "Mutations and Adaptations in Bacteria," by C. N. Hinshelwood; "Étude de l'action de quelques cations divalents sur les combinaisons acide phytique-protéine," by R. Barré, J. E. Courtois, and G. Wormser; "Application of the Symbiosis Phenomenon among Lactic Acid Bacteria to the Study of the Biosynthetic Pathways of Growth Factors," by Veikko Nurmikko; "Activity-pH-curve of Yeast Invertase and the Mechanism of Hydrolase Action," by Karl Myrbäck; "Gedanken über die Bedeutung der makromolekularen Chemie für die Biologie," by Hermann and Magda Staudinger; "Chromatographic Experiments with Proteins," by Arne Tiselius; "Recent Advances in the Chemistry of Some Natural Polymers Containing Amino Sugars," by M. Stacey; "Antibiotics and Nitrogen Excretion—With Special Reference to Penicillin," by W. H. Peterson; "Nitrogenous Compounds in Plants: Recent Knowledge Derived from Paper Partition Chromatography," by F. C. Steward, R. M. Zacharius, and J. K. Pollard; "The Energy Change in Organic Rearrangements and the Electronegativity Scale," by Linus Pauling; "Remarks on the Physiological Importance of the Nucleoside Phosphotransferases," by Erwin Chargaff; and "A Universal Definition of the Concept of \gg Buffer \ll , Founded on Brønsted's Acid-Base Definition," by Holger Jørgensen.

Representative articles describing primarily sets of experiments include, "Photoperiodism and Photosynthetic